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DHEAS and cortisol correlate with Hypothalamic Serotonin-1A Receptors

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Background

Serotonin modulates the activity of the hypothalamic-pituitary-adrenal (HPA) axis, to a big part through the serotonin-1A receptor (5-HT1A) [1]. In return, hormones of the HPA axis, namely dehydroepiandrosterone sulfate (DHEAS) [2] and cortisol have regulatory effects on the serotonergic neurotransmission.

Materials and methods

Eighteen healthy female subjects participated in this PET study. The selective 5-HT1A receptor antagonist [carbonyl-11C]WAY-100635 was used as radioligand. The hypothalamus as an essential part of the HPA axis and eight control regions of interest and the cerebellum as reference region were defined a priori and delineated on co-registered MR images. DHEAS and cortisol plasma levels were ascertained by morning blood collections on the PET day. The 5-HT1A receptor binding potentials of the target brain regions were correlated with DHEAS, cortisol plasma levels and the ratio of DHEAS / cortisol.

Results

We found highly significant correlations between the hypothalamic 5-HT1A receptor binding and DHEAS ($p=.003$) and the ratio of DHEAS / cortisol ($p<.0001$), but not with cortisol and not in other brain regions.

Conclusions

The 5-HT1A receptor may influence the DHEAS plasma level by modulating CRH and ACTH release as reported for cortisol before [1]. Vice versa, the interaction of cortisol and DHEAS may exert a regulatory effect on the 5-HT1A receptor distribution in the hypothalamus as a feedback loop. As disturbances of the HPA axis [3] as well as changes of the 5-HT1A receptor distribution [4] have been reported frequently in affective disorders, future studies should aim their focus on these interactions.

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